REMARKS

The undersigned first thanks the Examiner for the courtesy of discussing the October 4, 2002 Final Office Action during a telephone conference on Monday, December 30, 2002. As a result of that telephone conference, it was our understanding that the Examiner was generally agreeable to considering the additional arguments made in this Amendment After Final.

Reconsideration and allowance of all claims in view of the foregoing amendments and the following remarks are respectfully requested. Upon entry of this Amendment, Claims 8-27 will be pending in the application (not Claims 1-22 as erroneously shown in the Office Action Summary Sheet).

In the October 4, 2002 Final Office Action, the Examiner rejected Claims 8-13 and 15-27 under 35 U.S.C. § 103(a). The Examiner's rejections of Claims 8-13 and 15-27 based upon the prior art are traversed below. Although Applicants believe that the previously pending claims are in condition for allowance and traverse the Examiner's rejections, independent Claims 8 and 22 have nonetheless been amended herein in order to expedite the prosecution of this patent application without prejudice or disclaimer to Applicants' right to seek further prosecution of the previously pending claims in a continuation application. Applicants respectfully submit that the claim limitations of amended Claims 8 and 22 are fully supported by the original disclosure, and that entry of the claim amendments would not introduce new matter into the application.

Objection To The Drawings

In the Final Office Action, the Examiner objected to the drawings because the limitation in Claim 15 is not shown in the drawings. It is respectfully submitted that the Examiner's objection is misguided. The claim limitation in Claim 15, *i.e.*, the analog-to-digital converter in form of an integrated circuit mounted on a resistive shunt, is disclosed by FIG. 1. *See, e.g.*, Application, p. 4, lines 10-12 ("In the example shown in Figure 1, there is a separate signal pre-processing ASIC [application specific integrated circuit] 15 mounted on each of the shunts 14 . . . ."). Applicants respectfully submit that the drawings show every feature of the invention specified in all of the pending claims in accordance with 37 C.F.R. § 1.83(a). Accordingly, it is respectfully requested that the objection to the drawings be withdrawn.

Claim Rejections - 35 U.S.C. § 103

In the Final Office Action, Claims 8-13, 15, 18, 20 and 22-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,701,253 to Mayell et al. ("the Mayell Patent"). In addition, Claims 16 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Mayell Patent in view of U.S. Patent No. 6,034,521 to Eckardt. Furthermore, Claims 19 and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Mayell Patent in view of U.S. Patent No. 4,734,634 to Kito et al. Applicants respectfully traverse the Examiner's rejections.

The Mayell Patent is directed to a power meter using an isolated current shunt transducer and does not disclose or suggest the use of current shunts in a residual current detection device, as claimed herein. However, the Examiner continues to take a position that the Mayell Patent discloses all the essential elements of the claimed invention, *i.e.*, residual current detection device as claimed in independent Claims 8 and 22 (prior to this Amendment), even though the Examiner acknowledges that the Mayell Patent does not explicitly disclose circuitry for detecting an imbalance between the currents flowing through the resistive shunts. In particular, the Examiner states:

> [T]he applicant's "imbalance between the currents flowing through the resistive shunts" is the same as Mayell's:
>
> 1) measurements based on the voltage differences between the voltages at the first and second ends of the current shunts (which reflect the currents through the live wires) and the measured voltages [column 3, lines 11-20];
>
> 2) determining difference between voltages and phase angle between voltage and currents [column 4, lines 40-49], and in order to determine the difference between the phase angle, and phase power between the voltage and current [column 4, lines 40-49], which technically is equivalent to a circuitry detecting any imbalance between the current.

(October 4, 2002 Office Action, Paragraph 9).

Applicants respectfully disagree and submit that the Mayell Patent does not teach or even suggest detection of an imbalance between the currents flowing through the disclosed current shunts.

The Mayell Patent is directed solely to a power measurement device. According to the Mayell Patent, the difference between the voltages across each current shunt is used to only measure the current flowing through each respective shunt, not current differences between shunts. The voltage that is common to the two ends of the current shunts is also measured. *See* Mayell, Col. 2, lines 41-56. The Mayell Patent further discloses different types of power measurements. *See* Mayell, Col. 4, lines 31-49. For example, instantaneous power is defined as the product of the magnitude of the voltage on a line and magnitude of the current through the line at any moment in time. Active power may be defined as the product of the root-mean-squared voltage, the root-mean-squared current, and the cosine of the phase angle between the voltage and current waveforms.

The power measurements described in the Mayell Patent never involve detecting differences between currents flowing in different lines. For example, in order to measure the power delivered by each phase of the circuit, the power meter described in the Mayell Patent would measure the difference between the voltages across the current shunt on the phase line or the difference between phase angles of the voltage and current waveforms on the phase line. However, nowhere in the Mayell Patent is there any teaching or suggestion of a residual current detection device based on detecting the difference between the currents flowing through the lines into and out of the load. Nowhere in the Mayell Patent is there any teaching or suggestion that such detection of

current difference is necessary for measuring any type of power or the phase angle between voltage and current waveforms. Indeed, Applicants submit that it is neither necessary nor suggested in the Mayell Patent.

Furthermore, the Mayell Patent does not disclose any means for detecting or calculating the current imbalance between lines connected to a load. Applicants respectfully submit that circuitry for determining the differences in voltages or phase angles for power measurements as described in the Mayell Patent, is not technically equivalent to circuitry for detecting a difference or imbalance between the currents flowing into and out of the load on different lines. Therefore, it is respectfully submitted that the Mayell Patent does not teach or suggest circuitry for, or the step of, detecting an imbalance between the currents flowing through the resistive shunts, as required by independent Claims 8 and 22 prior to the amendments made herein.

Likewise, the Mayell Patent does not teach or suggest a processor or a processing step to detect the imbalance between the currents flowing through the resistive shunts as required by Claims 9 and 23 of the present application. The signal processing circuit 22 (mislabeled as 12 in the figure), described in FIG. 1 and Col. 4, lines 25-49 of the Mayell Patent and relied upon by the Examiner, is merely directed to power measurements. Nowhere in the Mayell Patent is there any teaching or suggestion of a processor for processing the signals from the voltage sensors to detect the imbalance between the currents flowing through the resistive shunts on different lines or that current difference

detection is necessary for measuring any type of power or the phase angle between voltage and current waveforms. Therefore, it is respectfully submitted that the Mayell Patent does not teach or suggest a processor or step for processing the signals from the voltage sensors to detect the imbalance between the currents flowing through the resistive shunts as required by Claims 9 and 23 of the present application.

In the Final Office Action, the Examiner also continues to take a position that the Mayell Patent discloses an analog-to-digital converter in the form of an integrated circuit mounted on a corresponding one of the resistive shunts as claimed in Claims 15 and 25 of the present application. The Examiner relies upon FIG. 3 and Col. 5, lines 4-11 & 52-59 of the Mayell Patent to support his position and states that the Mayell Patent discloses that the converters are connected to the resistive shunts, either electrically or physically. Applicants respectfully submit that such disclosure by the Mayell Patent does not render Claims 15 and 25 obvious. Claims 15 and 25 are directed to a specific physical embodiment of a residual current detection device having an analog-to-digital converter in the form of an integrated circuit physically **mounted** on a resistive shunt as shown in FIG. 1. *See, e.g.*, Application, p. 4, lines 10-12 ("In the example shown in Figure 1, there is a separate signal pre-processing ASIC [application specific integrated circuit] 15 mounted on each of the shunts 14 . . . ."). According to these claims, the integrated circuit is not merely electrically or physically connected to a resistive shunt in any form or manner.

Although the Mayell Patent discloses an analog-to-digital converter in the form of an integrated circuit for use in a power meter, it does not disclose those integrated circuits being **mounted** on resistive shunts. According to FIG. 2 and Col. 4, lines 50-55 of the Mayell Patent, the multiple integrated circuits for a power meter reside in a single silicon chip (52). FIG. 2 shows that all the analog-to-digital converters (51a, 51b and 56c) reside within a single silicon chip (52) while the current shunts (12a-12c) reside outside the silicon chip (52). Therefore, even if the Mayell Patent showed all other features of the claims in question (which it does not), it would not be physically possible for each converter to be mounted on a corresponding one of the shunts in the embodiment shown and described in FIG. 2 and Col. 4, lines 50-55 of the Mayell Patent. FIG. 3 and Col. 5, lines 4-11 & 52-59 of the Mayell Patent likewise do not disclose that a converter in the form of an integrated circuit is mounted on a corresponding one of the shunts. Thus, it is respectfully submitted that the Mayell Patent does not teach or suggest that a converter in the form of an integrated circuit be mounted on the resistive shunt as required by Claims 15 and 25 of the present application. Rather, the Mayell Patent teaches away from this aspect of the present invention.

As shown in the foregoing remarks, the Mayell Patent does not teach or suggest a residual current detection device which operates by detecting an imbalance between the currents flowing through resistive shunts connected in series with a load. Therefore, the Mayell Patent, either alone or in combination with any other prior art of record, does not

teach or suggest all the claim limitations of originally filed Claims 8 and 22, and therefore, does not make out a *prima facie* case of obviousness. MPEP 2143. Furthermore, all other claims dependent from originally filed Claim 8 or Claim 22 cannot be obvious over the Mayell Patent, because, among other reasons, the Mayell Patent does not meet all of the claim limitations of Claims 8 and 22. *Id.* For these and the foregoing reasons, Applicants respectfully traverse the Examiner's Section 103 rejections as to originally filed Claims 8-13 and 15-27 .

Although Applicants believe that the previously pending claims are in condition for allowance and traverse the Examiner's rejections of these claims based upon the prior art, in order to expedite the prosecution of this application, Applicants have nonetheless amended independent Claims 8 and 22 to explicitly require the presence of a resistive shunt in a neutral line carrying current out of a load in addition to resistive shunts in one or more phase lines carrying currents into the load. Applicants have replaced independent Claims 8 and 22 with the foregoing amended claims without prejudice or disclaimer to Applicants' right to pursue these claims in a continuation application. Therefore, the Examiner's claim rejections are also rendered moot by the foregoing amendments to independent Claims 8 and 22.

As amended, Claims 8-27 are directed to a device for and method of detecting imbalances between currents flowing to a load in one or more phase lines and from the load in a neutral line by use of resistive shunts, each of which is placed in series with

each of the phase lines and the neutral line. The foregoing amendments to independent Claims 8 and 22, requiring the presence of a resistive shunt in each of the phase lines and the neutral line, are fully supported by the original disclosure. For example, FIG. 2 shows a three-phase device with four resistive shunts 14, one in each phase line and a fourth in the neutral line. *See* Application, FIG. 2 & p. 4, lines 26-27 & p. 5, line 1.

Applicants respectfully submit that the claimed invention is **structurally distinguishable** from the prior art cited by the Examiner in the Final Office Action, including the device disclosed in the Mayell Patent. The Mayell Patent is directed to a power meter using an isolated current shunt transducer and, as the Examiner acknowledges, does not explicitly disclose circuitry for detecting any imbalance between the currents flowing through the resistive shunts. Additionally, the Mayell Patent does not disclose or even suggest the presence of a resistive shunt in the **neutral line**. Compare the neutral line 26 in FIG. 1 of the Mayell Patent with the neutral line N (with a resistive shunt 14 connected in series with the neutral line) in FIG. 2 of the present application.

Because the Mayell Patent is only directed to a power meter to measure the power delivered by each phase of the circuit, it only teaches measuring of the current through each live wire 14 (*i.e.*, phase lines) using current shunts 12a-12c. *See* Mayell, FIG. 1, Col. 1, line 64 - Col. 2, line 4 & Col. 3, lines 47-50. Unlike the claimed invention of the present application, the Mayell Patent does not teach or suggest measuring of the current

through a neutral line using a resistive shunt, let alone detecting of an imbalance between the currents flowing through the phase lines and the neutral line using resistive shunts. This structural difference between the claimed invention and the device disclosed in the Mayell Patent addresses the Examiner's concern that apparatus claims must be structurally distinguishable from the prior art in accordance with MPEP 2114.

Amended independent Claims 8 and 22 of the present application require the presence of a resistive shunt in the neutral line for detection of an imbalance between the currents flowing through the phase lines and the neutral line. As shown in the foregoing remarks, the Mayell Patent does not teach or suggest the presence of a resistive shunt in the neutral line and, therefore, the claimed invention is structurally distinguishable from the device disclosed in the Mayell Patent. Therefore, the Mayell Patent, either alone or in combination with any other prior art of record, does not teach or suggest all the claim limitations of amended Claims 8 and 22 and, therefore, does not make out a *prima facie* case of obviousness. MPEP 2143. Furthermore, all other claims dependent from Claim 8 or Claim 22 cannot be rendered obvious over the Mayell Patent, because, among other reasons, the Mayell Patent does not meet all of the claim limitations of Claims 8 and 22. *Id.* For these and the foregoing reasons, withdrawal of the Section 103 rejections over the cited references is respectfully requested.

Allowable Subject Matter

In the Final Office Action, Claim 14 was objected to for being dependent upon a rejected base claim. The Examiner further stated that Claim 14 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Because of the foregoing amendments to the base claim, it is respectfully submitted that Claim 14 is in condition for allowance without the need that it be rewritten in independent form. Accordingly, withdrawal of the objection to Claim 14 is respectfully requested.

CONCLUSION

In light of the foregoing amendments and remarks, it is respectfully submitted that the rejections and objections be withdrawn and that all of the pending claims in the present application be allowed over the cited references.

No fees or extensions of time are believed to be necessary for the entry of this Amendment. However, authorization is given hereby to charge any deficiency, or charge any extension of time fees necessary to preserve the pendency of the subject application, to Deposit Account No. 01-1785. If the Patent Examiner believes that a telephone

discussion would be helpful to expedite prosecution, he may call the undersigned at any convenient time.

Respectfully submitted,

AMSTER, ROTHSTEIN & EBENSTEIN
Attorneys for Applicants
90 Park Avenue
New York, New York 10016
(212) 697-5995

Dated: New York, New York
January 3, 2003

By: Abraham Kasdan
Abraham Kasdan
Registration No.: 32,997

Applicant	:	Robert Charles Skerritt et al.
Serial No.	:	09/720,782
Filed	:	December 27, 2000

SCHEDULE A

Redlined Version

8. (Amended) A residual current detection device for detecting ~~current~~ imbalances between currents flowing to a load in one or more phase lines and from said load in a neutral line, comprising:

a plurality of resistive shunts, each connected in series with ~~each of a plurality of lines through which currents can flow to and from a load~~ one of said phase lines and said neutral line; and

circuitry for detecting an imbalance between ~~the~~ said currents flowing through the resistive shunts.

22. (Amended) A method of detecting current imbalance in a residual current detection device between ~~a plurality of lines~~ one or more phase lines and a neutral line through which currents respectively flow to and from a load, said method comprising the steps of:

placing a resistive shunt in series with each of ~~the~~ said phase lines and said neutral line;

measuring the current flowing through each resistive shunt; and

detecting an imbalance between the currents flowing through the resistive shunts.